

Curry Moor Water Level Management Plan

Parrett Internal Drainage Board

CONSULTATION DRAFT – April 2011

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1. Approval of the Water Level Management Plan

This Water Level Management Plan has been prepared by the Parrett Internal Drainage Board for the Curry Moor area of the Drainage Board District. Contributions to the WLMP have been received from the Environment Agency, Natural England and others.

Water Level Management Plan – General details			
Plan area	Curry Moor (Parrett IDB)		
SSSI(s) covered	Curry and Hay Moors SSSI		
Region / Area	Somerset Levels and Moors		
IDB lead officer	Philip Brewin, Ecologist		
Agreement on the Adopted Water Level Management Plan			
“I agree with the proposals and actions set out in this Water Level Management Plan and confirm the Plan will help achieve favourable condition for the Sites of Special Scientific Interest covered by the Plan.”			
Position & Organisation	Name	Signature	Date
Chairman – Parrett Drainage Board	Peter Maltby		
Area Manager – Environment Agency	Nick Gupta		
Area Manager – Natural England	Mark Watson		

2. Introduction

2.1. Purpose of the Plan

Water Level Management Plans (WLMPs) are required for all areas which have a conservation interest and where water level management is important for the maintenance, or rehabilitation, of that interest (e.g. Sites of Special Scientific Interest (SSSIs), Special Protection Areas and Ramsar sites). WLMPs also provide a framework for balancing and integrating the water level requirements of agriculture, recreation, flood risk and conservation within an area.

Natural England is responsible for assessing the condition of SSSIs and has identified a number of wetland SSSIs in Somerset where changes in water level management are required to achieve favourable condition for each site (see Box 2). One of these sites is within the area covered by this Plan:

- Curry and Hay Moors SSSI (472ha), with 56% of the area being in an unfavourable condition due to inappropriate water management.

The activities of the Parrett IDB play an important role in maintaining a healthy natural environment in Somerset and the IDB acknowledges its statutory duties to nature conservation under the Land Drainage Act (1991), the Conservation (Natural Habitats etc) Regulations (1994), the Countryside and Rights of Way Act (2000) and the Natural England and Rural Communities Act (2006). This WLMP will assist the Parrett IDB in carrying out its nature conservation duties and help provide appropriate water level management required to achieve favourable condition for the Curry and Hay Moors SSSI. It will also help ensure effective management measures are in place to resolve problems and protect and sustain valued features of the area.

2.2. Plan area

The Plan area covers 2583 acres (1046 hectares) of what was the old Curry Moor Drainage Board District. This drainage district is now part of the area managed by the Parrett IDB and is illustrated on Map 1.

The Curry Moor and Hay Moor drainage area lies between the WLMP Plan areas of West Sedgemoor to the south and North Moor to the north, east of Taunton. The Plan area is bounded by Ham and Knapp villages to the south west, Lyng to the north and Stoke St Gregory to the south. The most eastern extent of the plan area is bounded by Baltmoor Wall. The Exeter to London railway line passes through the northern section of the Plan area.

2.3. Responsibility for preparation and implementation of the Plan

The Parrett IDB is responsible for the preparation, overall monitoring and review of this WLMP on behalf of the Drainage Authorities operating in the area, namely the Parrett IDB, the Environment Agency, Somerset County Council and Taunton Deane Borough Council. Each Drainage Authority has contributed information to enable the WLMP to be produced by the Drainage Board, and the end result is a collaborative effort by all the Authorities. Each Drainage Authority is responsible for implementing and monitoring their own actions within the WLMP, and for reporting to the Parrett IDB as appropriate.

The Parrett IDB will adopt and implement the WLMP in accordance with the criteria set out in Box 1.

Box 1: The approval and implementation of Water Level Management Plans

The following criteria will be used by the Parrett IDB when considering WLMPs for approval and when implementing actions relating to:

- a. Making recommendations regarding the approval of a WLMP as a plan of action;
- b. The construction of a capital improvement scheme as proposed within the approved WLMP;
- c. Changing water levels as proposed within the approved WLMP.

A. Continuation of existing good practices

Where the WLMP includes proposals to '*continue the current good practices regarding water level management, watercourse maintenance and operational procedures*', the Parrett IDB will satisfy itself that the current practices:

- Are technically sound;
- Satisfies the drainage and water level management needs of the area;
- Are environmentally sound;
- Are within the financial capacity of the Board to achieve;
- Will fulfil all the legal obligations of the Board, including those related to achieving favourable condition and biodiversity.

B. Undertake a capital improvement scheme

Where the WLMP includes a '*proposal to carry out a capital improvement scheme*', the Parrett IDB will satisfy itself that the proposed scheme:

- Is technically sound;
- Satisfies the drainage and water level management needs of the area;
- Is environmentally sound;
- Is within the financial capacity of the Board to achieve;
- Has been agreed in principle with the occupier(s) and owner(s) of the land where the capital scheme is to be built;
- Is within the legal power of the Board to implement.

C. Change water level management

Where the WLMP includes proposal is to '*change the water level management, watercourse maintenance or operational procedures*', the Parrett IDB will satisfy itself that the proposed change:

- Is technically sound;
- Satisfies the drainage and water level management needs of the area;
- Is environmentally sound;
- Is within the financial capacity of the Board to achieve;
- Is supported by the owners and occupiers of a significant majority of the land that would be affected by the proposed change being considered (see note below);
- Will fulfil all the legal obligations of the Board, including those related to achieving favourable condition and biodiversity;
- Does not carry a significant risk that the Board may face a legal claim for damages incurred by a third party as a consequence of its decision to change its current practice.

Notes: When considering a proposal to change water levels, the Parrett IDB will use the uptake of agri-environment scheme agreements (including proposals by the occupiers to upgrade their agreements), in the area likely to be affected by the proposed change, as an initial indication of the measure of compatibility of the farm holding/land management unit with the proposed change in water levels. Actual changes in water levels thereafter will be sought through the negotiation of appropriate land management agreements between the owners/occupiers of the land and the relevant authority (i.e. Higher Level Stewardship agreements between farmers and Natural England).

2.4. Consultation and Plan approval

Parrett IDB will consult drainage ratepayers, statutory bodies and other organisations on the Curry Moor WLMP from November 2010 to April 2011. Consultation responses, and any amendments to the WLMP arising from the consultation, will be considered by the Parrett IDB WLMP Committee in May 2011, before formal approval of the plan by the Parrett Drainage Board.

3. Hydrology, watercourses and infrastructure

3.1. Topography and soils

The land drained by the watercourses is low lying alluvium bordering the banks of the tidal and non-tidal reaches of the River Tone, which flows through the middle of the Plan area. The land surface varies from about 4.6m above Ordnance Datum Newlyn (ODN) in the centre of Curry Moor to about 10m ODN at the western edge of the Plan area. Embankments along the left and right banks of the River Tone have crest levels between 7.4m and 8m ODN.

3.2. Water supply

The mean annual rainfall for the Plan area is 716mm. This figure has been calculated using data from seven Environment Agency observer rain gauges located around the Curry Moor Plan area collected from 1961 to 2009.

The River Tone originates in the Brendon Hills to the east of Taunton, on the edge of Exmoor National Park and enters the Plan area downstream of Bathpool in Taunton. The Tone flows through the centre of the Plan area, with Curry Moor to the north west and Hay Moor to the south east of the river. The Tone is tidal from New Bridge Sluice to its confluence with the River Parrett downstream at Burrowbridge. Curry Moor Pumping Station is the main water level control structure for the Plan area. A series of tilting weirs and other penning structures are used to maintain water levels across the Plan area as land levels gradually increase from east to west.

Water is supplied to the Plan area from the River Tone, upstream of New Bridge Sluice, with Knapp Inlet and New Bridge Inlet feeding watercourses on Curry Moor and Higher Hay Moor Inlet feeding Hay Moor. Runoff from the local catchment also supplies small volumes of water to the Plan area. The Curry Moor and Hay Moor system also supplies water to North Moor, Salt Moor and Stan Moor in the summer.

Water management in the summer is mostly focused on the supply of water to the rhyne and ditch system and the maintenance of high ditch water levels for farming and conservation, except during periods of heavy rainfall when there is a risk of flooding. From early April to the end of November, sluice gates and penning boards are operated to raise water levels in the rhynes and ditches to summer pen levels. The maintenance of summer levels is required to:

- a) Provide wet fences around the fields and the watering of livestock;
- b) Maintain an appropriate groundwater table during the growing season;
- c) Maintain the conservation interest of the watercourses.

Details of the water supply inlets to the Plan area are given in Section 3.7.1 and the locations of structures are shown on Map 3.

3.3. Drainage

The principal outlet for water from the Plan is to the River Tone via the Curry Moor Pumping Station. Hay Moor is connected to the Curry Moor system by a syphon under the Tone at Hook Bridge, which allows water from Hay Moor to drain to the Curry Moor Pumping Station. Only relatively small volumes of water can be drained from the Plan area by gravity and therefore most of the excess water must be pumped to the Tone by the Curry Moor Pumping Station.

Curry Moor and Hay Moor are used as a flood storage reservoir when flows in the Tone exceed the capacity of the channel downstream of Hook Bridge and excess water cannot discharge to the Parrett. The main spillways to Curry Moor are located at Hook Bridge, though there are also several lower sections along both the left and right banks of the Tone along which water may spill into the moors. Flood water predominantly enters Hay Moor from Curry Moor via the Hay Moor Syphon under the Tone.

River levels in the Tone can remain high for extended periods, especially in winter, which can prevent the operation of the Curry Moor Pumping Station and result in large volumes of flood water entering the Plan area. Under such situations, flood water on Curry Moor can become several metres deep and may cause the temporary closure of New Road and Cuts Road. If flooding from the Tone is severe and prolonged, then flood levels on Curry Moor and Hay Moor will eventually overtop the Athelney Spillway and the Lyng Railway Cutting into North Moor. Under extreme conditions, flood water may also overtop Baltmoor Wall to North Moor.

The Environment Agency seeks to balance the fluvial flows in the Parrett and Tone at their confluence at Burrowbridge by diverting some of the flow in the Parrett down the Parrett Flood Relief Channel (River Sowey). This then allows a slightly greater flow of flood water from the Tone into the Parrett. The limited flow capacity in the Tone between Hook Bridge Spillway and the confluence with the River Parrett is recognised as being a significant factor in the operation of the spillways and the use of Curry and Hay Moors as a flood water storage area. The Environment Agency recently undertook a study to monitor the capacity and efficiency of the Parrett and Tone to determine the need for a programme of de-silting and whether or not this can be justified on the grounds of flood risk management or the maintenance of adjacent SSSIs.

Water levels are generally lowered in winter to allow better drainage and to reduce the risk of overland flooding. However, most watercourses retain a pen level in winter to maintain the conservation interests and to reduce frost damage and the erosion of banks.

3.4. Asset management systems

The Environment Agency manages its assets using a Flood Risk Management (FRM) system approach. An FRM system is defined as “a group of assets that work together to reduce the flood risk to the people, infrastructure and environment within the system”. Each system has its own specific Management Plan.

Performance specifications are given to each system to guide maintenance standards. The maintenance works are then carried out by the Environment Agency’s Operations Delivery Team. This process is used to direct the highest standards of maintenance to where they are needed most (i.e. people, property and environment) using a risk based approach. The Environment Agency has adopted three categories to prioritise maintenance for each FRM system:

- **High** – Generally urban areas with high populations or rural areas with high environmental designations.
- **Medium** – Urban to rural areas with relatively low population densities.
- **Low** – Sparsely populated areas and agricultural land.

The FRM system that covers the Curry and Hay Moors WLMP area is:

- **FR14S029 Curry/Hay/Salt/North Moors (High)**

The Curry/Hay/Salt/North Moors FRM system has been categorised as a high priority system because of its status as a flood storage reservoir, but also because of the high environmental designations of the adjoining land and the importance of water management to these environmental assets.

Each Environment Agency maintained asset is listed in the National Flood and Coastal Defence Database (NFCDD). This provides a definitive store for all data on flood and coastal defences. It records inspections, identifies asset condition, residual life and recommends any works required and their urgency.

The Parrett IDB manages its assets in the Plan area under a comparable asset management system.

3.5. The strategic context for water management

There are a number of strategic plans and documents which provide the context for this Water Level Management Plan, including:

- *The Catchment Flood Management Plan* - A summary version is available on the Environment Agency website.
- *Catchment Abstraction Management Strategies (CAMS)* - These documents are currently being revised for re-release in 2011.
- *Lower Parrett & Tone Flood Management Strategy* - Working Draft prepared in February 2005.
- *Parrett and Tone Channel Monitoring Project 2008-09*.
- *Water Framework Directive and South West River Basin Management Plan* - The plan is available on the Environment Agency website.

3.5.1. Catchment Flood Management Plan

The Catchment Flood Management Plan (CFMP) for the River Parrett provides an overview of flood risk management in the catchment for the next 100 years. The CFMP is intended to guide Flood Risk Management (FRM) investment in the catchment by the Environment Agency and other bodies with FRM responsibilities and powers. The CFMP was produced in 2008 and will be reviewed every six years.

The Environment Agency has adopted Policy Option 6 for the floodplains of the Parrett catchment. This would involve the Environment Agency, and others, taking action to increase the frequency of flooding within the King's Sedgemoor and Aller Moor WLMP area to deliver benefits locally or elsewhere. By redistributing flood water from upstream of Langport to the King's Sedgemoor Drain the overall damage and disruption from flooding would be reduced. Within this context, work will be required to maintain the safety of the existing River Parrett embankments and flood management infrastructure.

The Environment Agency has adopted Policy Option 6 for the floodplains of the Parrett catchment. This would involve the Environment Agency, and others, taking action to increase the frequency of flooding within the King's Sedgemoor and Aller Moor WLMP area, if redistributing flood water from upstream of Langport to the King's Sedgemoor Drain reduced the overall damage and disruption from flooding. Work will be required to maintain the safety of the existing River Parrett embankments and flood management infrastructure.

3.5.2. Catchment Abstraction Management Strategy

The Environment Agency has developed Catchment Abstraction Management Strategies (CAMS) to assess the water availability in catchments and to ensure water resources are managed sustainably. As the Levels and Moors are penned systems, the current Strategy for the Parrett catchment (published March 2006) was unable to accurately assess the water requirements for these areas, and therefore the availability of water for abstraction. To address this problem the Environment Agency is preparing a new CAMS for the Levels and Moors, which is due for completion by February 2011. The aim of the new Strategy will be to identify what water may be available for abstraction and set an appropriate abstraction licensing policy for those rivers that are influenced by the inlets and outlets from penned systems. The new CAMS will not seek to change the water levels within penned systems, and will assume that the water levels stated in the WLMPs are appropriate. If the CAMS identifies that there is surplus water available in the catchment, then it will also consider how much of this water is available for new abstraction licences. Where over abstraction is identified it will consider what actions are necessary to redress the balance.

3.5.3. Lower Parrett & Tone Flood Management Strategy

This draft report looks at the long term flood management of the River Parrett and the River Tone downstream of Taunton and Langport. The strategic aim is to achieve sustainable flood management within the area, minimise the impact on communities and maximise opportunities for wildlife and other local interests. Most of the area has a significant risk of flooding from either fluvial and / or tidal sources. Embankments provide most of the flood protection in the area and there is an increasing risk of breaching due to bank condition and climate change. Various options have been recommended for further study.

3.5.4. Parrett and Tone Channel Monitoring Project

This study modelled the effects dredging could have on conveyance of high river flows and the impact on flood risk in adjacent moor areas and is now complete. The study recommended that a more sophisticated approach to dredging should be considered, which may deliver limited flood risk reductions in certain areas. However, the report also concluded the following:

- Ongoing, comprehensive channel monitoring and surveying will be fundamental to inform any decision to dredge.
- Before any dredging strategy is implemented the economic viability must be ascertained.
- There will be significant environmental constraints in undertaking any dredging activity and this may restrict the effectiveness of any potential opportunity to dredge.
- Dredging the channel only results in, at best, small changes in water levels in the rivers and adjacent moors during flood events.
- If dredging is undertaken then it will need to follow a more sophisticated approach than has previously been done. This needs to be concurrent with monitoring to ensure dredging does not have a negative effect.

Therefore the viability of a programme of dredging activities will be highly dependent on the economic and environmental feasibility. A full appraisal will be proposed to establish a business case to put forward the recommendations in the report.

3.5.5. Water Framework Directive

The Water Framework Directive (WFD) is a European Directive which introduces a new strategic planning process for the purposes of managing, protecting and improving the water environment. For this area, this will be delivered through the South West River Basin Management Plan, which is available on the Environment Agency website. The River Basin Management Plan (RBMP) sets out actions for the Environment Agency and other partnership organisations. The aim is to prevent deterioration in the status of water bodies and move all water bodies closer to achieving good ecological status or, in the case of heavily modified / artificial water bodies, good ecological potential. Any plans or works affecting water bodies identified in the RBMP need to be mindful of its aims and not compromise any WFD objectives connected with those water bodies.

3.6. Watercourses

3.6.1. Main Rivers

The Environment Agency has permissive powers to manage designated Main Rivers to reduce the risk of flooding property and the risk to human life. There are six Main Rivers within the Plan area: River Tone, Curry Moor Main Drain, Hay Moor Main Drain, Tank Rhyne, Curry Moor Engine Rhyne and North Moor Inlet Rhyne. The River Tone flows through the Plan area, between Curry Moor and Hay Moor, and is tidal as far as Newbridge Sluice. Summary details of these watercourses are set out in Table 1. The locations of the Main Rivers are shown on Map 2. The control structures on these watercourses are listed in Tables 2 – 4.

3.6.2. IDB watercourses

The Parrett IDB is responsible for maintaining a network of arterial watercourses in the Plan area known as 'Viewed Rhynes'. Watercourses can be taken into, or out of, view by resolution of the Board. There are over 46 kilometres of IDB maintained Viewed Rhynes in the Plan area.

Summary details of the Viewed Rhynes for Curry and Hay Moors are set out in Table 1 and their locations are shown on Map 2. The control structures on these watercourses are listed in Tables 2 – 4.

3.6.3. Ordinary watercourses

All watercourses that are not designated as Main Rivers or Viewed Rhynes are called ordinary watercourses, the maintenance of which is the responsibility of the riparian owners. Ordinary watercourses provide an extensive network of ditches that forms an integral part of the drainage and water supply system. Ordinary watercourses also represent a substantial part of the important habitat and wildlife interest of the Plan area.

Table 1: Schedule of arterial watercourses in the Curry Moor area

Asset No.	Watercourse	Operating Authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Table 4)
8950	River Tone	EA	13600 (tidal extent)	The River Tone originates in the Brendon Hills on the edge of Exmoor National Park. The river enters the Plan area downstream of Taunton and flows in a north easterly direction until its confluence with the Parrett at Burrowbridge. New Bridge Sluice is the tidal limit of the Tone.	W6 specification is used between Stanmoor Bridge and New Bridge. W7 is used between Athelney Bridge and New Bridge in order to leave a wide fringe along the water's edge. W7 specification is used between New Bridge and Ham Weir. All cuts are taken twice annually in July and September.	New Bridge Sluice Hook Bridge Spillway Knapp Inlet Higher Hay Moor Inlet New Bridge Inlet
8991	Curry Moor Main Drain	EA	6600	Originating from the non tidal Tone, north of Knapp, the Main Drain flows in a north easterly direction through the centre of the Curry Moor plan area.	W3 specification is used in June and August. Weed is cut in the channel using a Bradshaw Bucket attachment on a long reach tracked vehicle. Emergent weed on the non working bank is retained, except where it encroaches across the channel. The working bank is flailed, and alternated yearly.	Knapp Inlet New Bridge Inlet Penning Bay C1 Penning Bay C2 Penning Bay C3 Penning Bay C4 Penning Bay C5
8993	Hay Moor Main Drain	EA	4400	Originating from the Tone downstream of Knapp Bridge, Hay Moor Main Drain flows in a north easterly direction through Hay Moor. At Hook Bridge, the Drain flows under the Tone and into Tank Rhyne, before joining the Curry Moor Main Drain.	W3 specification is used in June and August. Weed is cut in the channel using a Bradshaw Bucket attachment on a long reach tracked vehicle. Emergent weed on the non working bank is retained, except where it encroaches across the channel. The working bank is flailed, and alternated yearly.	Higher Hay Moor Inlet
8992	Curry Moor Engine Rhyne	EA	1300	Starts south of East Lyng and flows north under the railway lines before changing direction towards the Curry Moor Pumping Station. The Curry Moor Main Drain flows into the Engine Rhyne upstream of the Pumping Station. This last section of Engine Rhyne is often referred to as the Main Drain.	W3 specification is used in June and August. Weed is cut in the channel using a Bradshaw Bucket attachment on a long reach tracked vehicle. Emergent weed on the non working bank is retained, except where it encroaches across the channel. The working bank is flailed, and alternated yearly.	Curry Moor Pumping Station
8995	North Moor Inlet Rhyne	EA	350	Flows from the Curry Moor Engine Rhyne at a culvert, south east of the village of Lyng, to Baltmoor Wall. The watercourse ends here and is diverted into North Moor or Salt Moor via the Northmoor and Saltmoor inlets.	W2 in June or July, and September. Bradshaw weed cuts are taken, emergent weed is removed on the working bank and retained on the non working bank.	Baltmoor Wall Inlet
8994	Tank Rhyne	EA	1500	Flows in a north easterly direction from the Tone at Stoke Drove to Curry Moor Main Drain, downstream of Turkey Cottage.	W2 specification in June and September. Bradshaw weed cuts are taken, emergent weed is removed on the working bank and retained on the non working bank.	Fox's Mead Clyse No 1 Fox's Mead Clyse No 2 Cames Mead Sluice (Tanners Bar Sluice) Tanners Bar Syphon Hay Moor Syphon Hay Moor Outfall

Table 1(continued): Schedule of arterial watercourses in the Curry Moor area

Asset No.	Watercourse	Operating Authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Table 4)
1	Westmoor Drove Rhyne	IDB	2429	North side of Westmoor Drove, upstream of Knapp bridge.	Annual weed cut	CM002, CM014
2	Haymoor Drove Rhyne	IDB	1932	South side of Haymoor Drove	Annual weed cut	CM019, CM020
3	Haymoor Old Rhyne	IDB	2012	From just below Moredon eastwards to Haymoor Main Drain.	Annual weed cut	
4	Haymoor Rhyne	IDB	1177	South of, and parallel to Haymoor Old Rhyne.	Annual weed cut	CM011
5	Short Drove Rhyne	IDB	768	North side of Short Drove, and connects with Haymoor Rhyne to the south.	Annual weed cut	
6	Moredon Drove Rhyne	IDB	1487	South side of Moredon Drove.	Annual weed cut	CM006
7	Currymoor Drove Rhyne	IDB	3840	North side of Curry Moor Drove, from Knapp Bridge eastwards to Old Rhyne.	Annual weed cut	CM004, CM005, CM007, CM008, CM010, CM013, CM015, CM016, CM017
8	Stoke Drove Rhyne	IDB	223	Short length of rhyne on south-west side of Stoke Drove.	Annual weed cut	CM018
9	Old Drove Rhyne	IDB	5243	Follows northern edge of area, from downstream of Knapp Bridge to just south of Lyng village.	Annual weed cut	CM003, CM009, CM012
10	Centre Rhyne	IDB	1984	Complex of rhyne to the south of Lyng Village.	Annual weed cut	
11	Old Mead Rhyne	IDB	305	Along east side of Old Mead Rhyne.	Annual weed cut	
12	Curry Moor Close Rhyne	IDB	530	To the west of Foxes Mead.	Annual weed cut	
13	Currymoor Drove Rhyne (extra)	IDB	360	South of Curry Moor Main Drain, just west of Hook Bridge.	Annual weed cut	
14	Not allocated					
15	Haymoor End - extend from end of EA section	IDB	176	North of Moredon Drove, just east of New Road.	Annual weed cut	
16	Currymoor Close Rhyne Extra	IDB	178	Southern branch of Currymoor Close Rhyne.	Annual weed cut	
17	Sandpits Corner Rhyne	IDB	171	From Sandpits Corner east to Curry Moor Main Drain.	Annual weed cut	

Table 1(continued): Schedule of arterial watercourses in the Curry Moor area

Asset No.	Watercourse	Operating Authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Table 4)
18	Westmoor Rhyne	IDB	1536	North and west of Knapp village.	Annual weed cut	CM001
19	Haymoor Old Rhyne (Upper)	IDB	1196	Along south edge of Plan area, from Lower Knapp east to Morden.	Annual weed cut	CM019, CM020
1	B&T Canal to end of track by Ham Weir	IDB	655	From Canal south to R Tone at Ham Weir.	Annual weed cut	
2	Brickyard Farm to R Tone (Bull Street)	IDB	1030	Along north side of Bull Street, from Brickyard Farm, east to R Tone at Ham Weir.	Annual weed cut	
3	Hyde Lane to Creech St Michael	IDB	1415	From Hyde Lane in Bathpool, east to Mill Lane in Creech St Michael.	Annual weed cut	
4	White Street to R Tone	IDB	245	Ham Road / White Street to R Tone.	Annual weed cut	
5	Ham Road	IDB	640	Rhynes south of Ham Road.	Annual weed cut	
6	Black Brook to R Tone	IDB	1030	From Black Brook (Junction 25 of M5) north east to R Tone,	Annual weed cut	

3.7. Structures

3.7.1. Structures controlling inflows

A number of structures are used to supply water to the Plan area (Table 2). Any proposed changes to these arrangements are set out in Section 9.

Table 2: Structures controlling inflows to the Curry Moor area

Asset No.	Inlet	Grid Ref.	Maintained by	Operated by
1122190100201R05001	Higher Hay Moor Inlet	ST 3057 2632	EA	EA
1122190100201L07001	Knapp Inlet	ST 3019 2606	EA	EA
1122190100201L02001	New Bridge Inlet	ST 3142 2697	EA	EA

3.7.2. Structures controlling outflows

A number of structures are currently operated to control the water leaving the Plan area, as set out in Table 3. Any proposed changes to these arrangements are set out in Section 9.

Table 3: Structures controlling outflows from the Curry Moor area

Asset No.	Outfall	Grid Ref.	Maintained by	Operated by
1122590200101B08001	Baltmoor Wall Inlet	ST 3360 2903	EA	EA
1122189920101R01001	Curry Moor Pumping Station	ST 3447 2882	EA	EA
1122189600101B01001	Stan Moor Pumping Station	ST 3614 2984	EA	EA
1122590300101B01001	North Moor Pumping Station (non standard outlet)	ST 3315 3301	EA	EA
1122590200101R01002	Salt Moor Pumping Station (non standard outlet)	ST 3531 3087	EA	EA

3.7.3. Structures controlling water levels within the area

Water control structures that currently are used to maintain water levels within the Plan area are detailed in Table 4.

Table 4: Schedule of control structures affecting water management in the Curry Moor area

Asset No.	Control structure	Grid Ref.	Maintained by	Operated by	Watercourse (see Table 1)	Description	Dimensions & operating range
1122190100 201B01002	New Bridge Sluice	ST 3163 2691	EA	EA	River Tone	Sluice gate and tilting weir	This structure was modified in 2008. Three gates 4.57m wide with tilting weir crests, integral with New Bridge, which is the tidal limit of the Tone. The structure is operated by electric motor from an adjacent control house. A 2.44m wide fish pass is also forms part of this structure.
1122189920 101R01001	Curry Moor Pumping Station	ST 3447 2882	EA	EA	Curry Moor Engine Rhyne	Pumping station	Two diesel pumps, one electric screw pump. Permanent infrastructure for use of portable pumps.
1122189500 103L02	Hook Bridge Spillway	ST 3352 2754	EA	EA	River Tone	Spillway	Spillway allowing flood waters from the Tone to spill into Curry Moor Flood Storage Area. Length 296.4m, lowest point 7.38m. The crest of the spillway consists of a concrete sill with wooden beam on top.
1122189930 101R04002	Hay Moor Syphon	ST 3372 2781	EA	No control	Hay Moor Main Drain	Syphon	1.52m diameter, 55m long Armco pipe under the Tone linking Hay Moor to the Curry Moor. Each end of the syphon is protected by a weed screen. Reservoirs Act structure.
1122189940 101L01001	Fox's Mead Clyse No 2 (Penstock)	ST 3366 2791	EA	EA	Tank Rhyne	Penstock	Cast iron 900mm square penstock, manages flows along the Hay Moor Main Drain. Manually operated.
1122189940 101R03001	Fox's Mead Clyse No 1 (Weir penstock)	ST 3366 2791	EA	EA	Tank Rhyne	Weir penstock	Aluminium 1200mm square penstock, manages flows along Tank Rhyne. Manually operated using a removable handle.
1122189600 102R02001	Stan Moor Inlet	ST 3383 2778	EA	EA	Hay Moor Main Drain	Penstock	450mm diameter, 200m long pipe from Hay Moor Syphon to Stan Moor Main Drain with a sluice in an intermediate manhole, which has a metal lid
1122189500 102L12	Baltmoor Wall	ST 3377 2908	EA	EA	Baltmoor Wall	Flood embankment	Flood embankment between Lyng towards Athelney Farm, with a crest level 7.9 - 8.0m. Reservoirs Act structure.
1122590200 101B08001	Baltmoor Wall Inlet	ST 3360 2903	EA	EA	Curry Moor Engine Rhyne	Sluice penstock	20m long culvert, 450mm diameter sluice penstock; 3.96m invert. Reservoirs Act structure.
1122590200 101L09003	North Moor Inlet	ST 3359 2905	EA	EA	Salt Moor Main Drain	Sluice penstock	12m long culvert, 450mm diameter sluice penstock; 3.50m invert.
1122590200 101B07004	Salt Moor Inlet	ST 3359 2905	EA	EA	Salt Moor Main Drain	Sluice penstock	300mm diameter sluice penstock; 3.80m invert.
1122189500 102L14	Athelney Spillway	ST 3427 2925	EA	EA	Near Athelney Hill, between Curry Moor & Salt / North Moor	Spillway	25.9m long grassed earth bank with a crest level of 7.13m located west of Athelney Farm. Reservoirs Act structure.
1122189500 102L15	Lyng Railway Cutting	ST 3312 2879	Private	EA	Disused railway cutting near Lyng	Spillway	Disused railway cutting south east of Lyng, which acts as a spillway if Curry Moor is full. Crest level of 7.18m. Reservoirs Act structure.

Table 4 (continued): Schedule of control structures affecting water management in the Curry Moor area

Asset No.	Control structure	Grid Ref.	Maintained by	Operated by	Watercourse (see Table 1)	Description	Dimensions & operating range
1122190100 201L07001	Knapp Inlet	ST 3019 2606	EA	EA	Curry Moor Main Drain	Sluice penstock	600mm wide, manually operated sluice penstock centrally located in a 2.15m wide concrete chamber.
1122190100 201L02001	New Bridge Inlet	ST 3142 2697	EA	EA	Curry Moor Main Drain	Penstock	1050mm wide sluice penstock in a 2060m wide, 1.90m high concrete headwall on the Tone side of the bank.
1122189910 104R01022	Penning Bay C1 (Currymoor Drove Tilting Weir)	ST 3033 2641	EA	EA	Curry Moor Main Drain	Tilting weir	1300mm wide tilting weir installed 2004
1122189910 104R01013	Penning Bay C2	ST 3074 2686	EA	EA	Curry Moor Main Drain	Tilting weir	1300mm wide tilting weir installed 2004
1122189910 104L01001	Penning Bay C3 (Currymoor Drove Weir Penstock)	ST 3142 2712	EA	EA	Curry Moor Main Drain	Penstock	New over-shot penstock installed 2004.
1122189910 104R01002	Penning Bay C4 (Currymoor Drove Tilting Weir)	ST 3159 2713	EA	EA	Curry Moor Main Drain	Tilting weir	1300mm wide tilting weir installed 2004
1122189910 103R01003	Penning Bay C5 (Stoke Drove Tilting Weir)	ST 3251 2759	EA	EA	Curry Moor Main Drain	Tilting weir	1300mm wide tilting weir installed 2004
1122190100 201R05001	Higher Hay Moor Inlet	ST 3057 2632	EA	EA	Hay Moor Main Drain	Penstock	Manually operated, cast iron sluice penstock, 600mm wide, at the end of a 600mm diameter, 10.4m long Armco pips passing through the flood bank.
1122190100 201R04001	Hedges Inlet	ST 3101 2674	EA	Private	Hay Moor Main Drain	Penstock	Redundant penstock
1122189930 101R03	Penning Bay H1 (Haymoor Drove Tilting Weir)	ST 3089 2631	EA	EA	Hay Moor Main Drain	Tilting weir	New 700mm tilting weir installed 2004.
1122189930 101B02002	Penning Bay H2 (Haymoor Tilting Weir)	ST 3155 2644	EA	EA	Hay Moor Main Drain	Tilting weir	New 700mm tilting weir installed 2004.
1122189930 101B01010	Penning Bay H3 (Moredon Drove Tilting Weir)	ST 3247 2686	EA	EA	Hay Moor Main Drain	Tilting weir	New 700mm tilting weir installed 2004.
1122189930 101B01005	Cames Mead Sluice (Tanners Bar Sluice)	ST 3325 2723	EA	EA	Hay Moor Main Drain	Weir penstock	Consists of a 1.15m wide weir penstock which operates over a 0.60m wide, 6m long and 2m high concrete headwall. This sluice acts as a weir.
No NFCDD number	Tanners Bar Syphon	ST 3326 2730	EA	Redundant	Hay Moor Main Drain	Syphon	Once took water from Hay Moor Main Drain under the Tone to Tank Rhyne. Now redundant after the construction of Hay moor Syphon. Has been filled in with concrete.

Table 4 (continued): Schedule of control structures affecting water management in the Curry Moor area

Asset No.	Control structure	Grid Ref.	Maintained by	Operated by	Watercourse (see Table 1)	Description	Dimensions & operating range
1122189301 01B01001	Hay Moor Gravity Outfall	ST 3373 2778	EA	Redundant	Hay Moor Main Drain	Penstock and flap	Gravity outfall for the Haymoor Main Drain into the Tone but is now redundant. It consisted of a 0.9m diameter pipe with a penstock on the upstream side and a flap at the outfall (Tone side)
CM001	Bay A	ST 2951 2579	IDB	IDB	Westmoor Drove Rhyne	Penning boards	Penning boards in concrete headwalls.
CM002	Weir B	ST 2997 2595	IDB	IDB	Westmoor Drove Rhyne	Tilting weir	Tilting weir
CM003	Weir J	ST 3004 2652	IDB	IDB	Old Rhyne	Tilting weir	Tilting weir
CM004	Weir C	ST 3038 2648	IDB	IDB	Currymoor Drove Rhyne	Tilting weir	Tilting weir
CM005	Weir F	ST 3084 2698	IDB	IDB	Currymoor Drove Rhyne	Tilting weir	Tilting weir
CM006	Bay D	ST 3189 2668	IDB	IDB	Moredon Drove Rhyne	Penning boards	Penning boards in concrete headwalls.
CM007	Weir G	ST 3167 2719			Currymoor Drove Rhyne	Tilting weir	Tilting weir
CM008	Sluice K	ST 3180 2727	IDB	IDB	Currymoor Drove Rhyne	Sluice & culvert	Culvert under drove with sluice valve / penstock on downstream side.
CM009	Weir E	ST 3148 2746	IDB	IDB	Old Rhyne	Tilting weir	Tilting weir
CM010	Weir L	ST 3209 2749	IDB	IDB	Currymoor Drove Rhyne	Tilting weir	Tilting weir
CM011	Weir M	ST 3320 2705	IDB	IDB	Cames Mead	Tilting weir	Tilting weir
CM012	Weir I	ST 3229 2797	IDB	IDB	Old Rhyne	Tilting weir	Tilting weir
CM013	Bay H	ST 3244 2791	IDB	IDB	Currymoor Drove Rhyne	Penning boards	Concrete box culvert under drove with penning boards.
CM014	Culvert under Westmoor Drove.	ST 2994 2595	IDB	IDB	Westmoor Drove	Culvert	Arched culvert, 600mm diameter.
CM015	Pipe under Currymoor Drove	ST 3126 2635	IDB	IDB	Currymoor Drove Rhyne	Pipe	225mm diameter supply pipe.
CM016	Pipe under Currymoor Drove	ST 3045 2655	IDB	IDB	Currymoor Drove Rhyne	Pipe	225mm diameter supply pipe.
CM017	Pipe under Currymoor Drove	ST 3090 2700	IDB	IDB	Currymoor Drove Rhyne	Pipe	450mm diameter supply pipe.
CM018	Pipe under Stoke Drove	ST 3244 2762	IDB	IDB	Stoke Drove	Pipe	300mm diameter supply pipe.

3.7.4. Gauge boards

The principal gauge boards within the Curry Moor area are summarised in Table 5. All gauge boards are metric and are levelled to metres above Ordnance Datum Newlyn (ODN) relative to local Ordnance Survey benchmarks.

Table 5: Gauge boards operated in the Curry Moor area

Location of gauge board	Grid reference	Notes	Operator	Reading on board (m)	ODN (m)	Difference in height (mm) ^[1]
Curry Moor Pumping Station	ST 3447 2882	Upstream	EA	-	-	-
Athelney Bridge	ST 3469 2905	u/s (starts at 7m)	EA	-	-	-
Hook Bridge Spillway	ST 3354 2750	u/s of Hook bridge, on opposite bank to spillway	EA	-	-	-
Newbridge Sluice	ST 3164 2690	Upstream	EA	9.000	8.979	-21
Newbridge Sluice	ST 3164 2690	Downstream	EA	9.000	8.985	-15
Foxes Mead Sluice	ST 3366 2791	Upstream	EA	7.930	7.934	4
Cames Mead Sluice	ST 3326 2724	Upstream	EA	5.600	5.602	2
Haymoor Drove (H1)	ST 3086 2629	Upstream	EA	6.580	6.561	-19
Haymoor Rhyne (H2)	ST 3154 2645	Upstream	EA	5.640	5.626	-14
Currymoor Drove (C1)	ST 3038 2648	Upstream	EA	6.100	6.065	-35
Currymoor Drove (C2)	ST 3081 2694	Upstream	EA	5.700	5.665	-35
Currymoor Drove (C3)	ST 3143 2712	Upstream	EA	5.610	5.551	-59
Currymoor Drove (C4)	ST 3159 2714	Upstream	EA	5.300	5.270	-30
Stoke Drove (C5)	ST 3251 2759	Upstream	EA	4.800	4.816	16
Westmoor Drove (CM002)	ST 2996 2595	Upstream	IDB	7.130	7.088	-42
Old Rhyne (CM003)	ST 3003 2652	Upstream	IDB	6.390	6.358	-32
Currymoor Drove (CM004)	ST 3039 2649	Upstream	IDB	6.280	6.248	-32
Currymoor Drove (CM005)	ST 3083 2697	Upstream	IDB	5.800	5.733	-67
Currymoor Drove Tilting Weir (CM007)	ST 3168 2719	Upstream	IDB	4.510	5.470	960
Currymoor Drove (CM008)	ST3180 2726	Upstream	IDB	5.560	5.509	-51
Old Rhyne (CM009)	ST 3149 2747	Upstream	IDB	5.840	5.823	-17
Currymoor Drove (CM010)	ST 3208 2748	Upstream	IDB	5.310	5.311	1
Haymoor (CM011)	ST 3320 2705	Upstream	IDB	5.300	5.286	-14

Notes: [1] Gauge boards with negative values read high relative to ODN.

3.7.5. Water level telemetry

The Environment Agency has installed telemetry where there is an operational need to be kept informed of water levels and to alert staff to changes in water levels. The Environment Agency has water level telemetry installed at Curry Moor Pumping Station and at the inlet side of the Haymoor Syphon on Haymoor Main Drain. The telemetry at the Pumping Station remotely monitors water levels in the Main Drain and the River Tone and has a series of alarms to alert staff when water levels go outside the agreed seasonal target levels. Alarms have also been created for weed screens, pump failure, mains failure and telemetry failure. Alarms are received 24 hours a day, seven days a week by a National Incident Communication Service. The alarms are then passed on immediately to the most appropriate duty officer in the local area.

3.8. Abstraction and other hydrological management issues

There are no known significant, ongoing water resource issues which directly influence, or are influenced by, water level management within this catchment.

The Water Act (2003) has introduced a new statutory framework for managing water resources. Under the Act the abstraction of up to and including 20 cubic metres per day (approximately 4,400 gallons per day) from surface water or groundwater does not require a licence from the Environment Agency regardless of the purpose for which the abstracted water will be used. Abstractions above 20 cubic metres per day require a licence, issued by the Environment Agency. The Water Act (2003) also removes a range of exempt activities that currently do not require an abstraction or transfer licence. However, this section of the legislation has not yet been enacted (see the EA website for further information on licensing requirements under the Water Act (2003)).

The Environment Agency will consult the Parrett IDB and Natural England regarding its consideration of applications for an abstraction licence.

There are four abstraction licences that may affect water management in the Plan area, which are summarised in Table 6.

Table 6: Abstraction licences in or near Curry Moor

Licence No	Description	Point name	Max daily Vol. (m ³)	Max annual vol. (m ³)
16/52/005/S/129	Tone (ST 2730 2530)	Industrial, commercial and public services	90	31822
16/52/005/G/109	Spring Feeding Pond (ST 2690 2440)	Water supply	2.27	386
		Spray Irrigation	18.18	977.27
16/52/005/S/560	Impoundment on Frog Lane Stream (ST 2930 2720)	Agriculture	500	11400
16/52/005/G/468	Spring Fed Res (ST 2830 2730)	Agriculture	54.6	4550

3.9. Water quality

There have been 20 years of steady water quality improvements across the Somerset Levels and Moors catchments; however, phosphate levels remain a concern. There are some local water quality issues in the Plan area related to diffuse and point sources of pollution. Diffuse pollution is primarily caused by high phosphate levels from nutrient enrichment (fertilisers) and private septic tank overflows. Point sources of pollution mainly occur at sewage treatment works.

The Environment Agency and Natural England are currently developing 'Diffuse Water Pollution from Agriculture' plans that aim to reduce nutrient enrichment of watercourses and promote good agricultural practice through the Catchment Sensitive Farming Programme. The Environment Agency has also undertaken nutrient modelling to identify the relative importance of diffuse and point sources to nutrient enrichment in the catchment and is working with the water companies to reduce nutrient discharges from sewage treatment works.

Weed-cutting activities can also cause significant drops in dissolved oxygen (DO) levels on most watercourses. The Environment Agency's Operations Delivery team take DO readings before and during weed cutting to ensure water quality does not deteriorate rapidly. If DO levels drop below 20%, all operations stop immediately, including the operation of Pumping Stations, especially in summer. This practice helps to prevent fish kill and unnecessary damage to the aquatic environment.

It is illegal to discharge raw sewage or trade effluent directly into any controlled watercourse. Controlled discharge of treated effluent requires consent to discharge, which must be obtained from the Environment Agency. The Environment Agency should be informed of any water pollution problems, particularly septic tank discharges, to allow investigation and improvement. In the event of a pollution incident being noted, assistance should be sought immediately from the Environment Agency's incident pollution hotline on 0800 80 70 60.

There are a number of discharge consents in or near the Curry Moor Plan area, as set out in Table 7.

Table 7: Discharge consents in or near Curry Moor

Consent no.	Site name	Grid reference	Discharge type
102257	Taunton (Ham) Sewage Treatment Works	ST 2805 2455	Sewage disposal works
070906	Woodland Road	ST 2500 2500	Sewerage network - sewers
101803	Lane End Pumping Station	ST 3402 2722	Sewerage network - pumping station
070896	Meare Elm	ST 3341 2633	Sewerage network - pumping station
102570	Curload Pumping Station	ST 3399 2798	Sewerage network - pumping station
NPSWQD001438	Barton Lane Pumping Station	ST 2651 2512	Sewerage network - pumping station
080573	Athelney Farm Bridgwater	ST 3460 2910	Livestock and food production
100261	The Rising Sun	ST 3043 2565	Public houses and bars
081764	Ham Farm (Taunton)	ST 2845 2500	Livestock and food production
070170	Tone Bridge Abattoir	ST 2740 2530	Slaughter houses
102759	Curry Moor Pumping Station	ST 3447 2881	Undefined or other

4. Agriculture and other land uses

4.1. Agriculture

Agriculture is the predominant and most extensive land use within the Plan area. Most of the land is divided into small fields which are usually separated by watercourses or a combination of hedge and watercourse. The watercourses are used to provide drinking water for livestock and as wet fences. The Parrett IDB recognises the importance of agriculture within the Plan area and the key role that the effective management of water has to play in enabling this land use to prosper within the area. The Board also recognises that additional investment in the water management system will be required in the years to come in order to achieve the combined objectives of conservation and farming in the Plan area.

Livestock farming is the primary land use, with improved, semi-improved and unimproved grassland used for grazing and for winter fodder covering about 80% of the farmed area. Livestock farming systems not only produce food but the wider land management they provide is crucial in delivering conservation outcomes, for example through agri-environment agreements. Farm businesses need continual re-investment to survive and if their food production and conservation land management are to continue.

Withies (willows) are grown on Curry Moor and on Hay Moor for making baskets, hurdles and furniture. The withy beds are harvested after leaf-fall in the late autumn or winter, and vehicular access to the beds is important for harvesting the crop at this time of year.

The growing need for food security, and the growing demand for quality food to supply the increasing population of the UK and elsewhere, may stimulate additional investment in agriculture on some farms in the area in the coming years. The larger farm units in particular have invested in productive capacity over the years and will continue to do so in line with market signals. Many will also continue to deliver environmental outcomes alongside food production. Within the Curry and Hay Moors SSSI, appropriate balances will be sought between agriculture, nature conservation value, flood risk and the vulnerability of peat soils.

4.2. Built development, services and transport

A number of domestic and commercial properties in the Plan area depend, either directly or indirectly on effective flood protection and water level management. Low lying properties, utilities infrastructure and minor roads (which provide essential transport links) would suffer from flooding or waterlogging without the appropriate maintenance of flood defences, Main Rivers and IDB Viewed Rhynes.

The provision of adequate land for housing and employment is a national priority and Local Planning Authorities are charged with ensuring that sufficient land is made available through the new Local Development Frameworks. However new development in areas of high flood risk may not be sustainable, particularly where these low lying areas are protecting existing development by providing space for water.

The Local Authorities consult the Environment Agency and the Parrett IDB on strategic plans, such as the new Local Development Frameworks, and on individual applications of significance. Planning Policy Statement 25 (PPS25, December 2006) sets out Government policy on development and flood risk. It aims to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk.

In the exceptional cases where new development is necessary in areas of flood risk, the policy aims to make it safe, without increasing flood risk elsewhere. Where possible, developers are

encouraged to work with the Planning Authority and the Drainage Authorities to use opportunities for new development to reduce flood risk overall.

4.3. Recreation

The Environment Agency has a duty to consider recreation on or near water and aims to create a quality of environment that people will be able to enjoy. The Agency's vision is to conserve and improve the quality of the river environment whilst balancing recreational interests on water (e.g. canoeists, rowers, anglers and boaters) and on riverbanks (e.g. cyclists, horse-riders, walkers and bird watchers).

4.4. Fisheries

The Environment Agency has a duty to maintain freshwater and eel fisheries. These fisheries are a major part of the wildlife interest and ecology of the Plan area; especially eels, which are widely distributed and are a favoured food for both otters and fish-eating birds. Works to improve water level management will have to consider fisheries improvements, and any new structures should allow for the free movement of eels and elvers. The Environment Agency's fisheries officers can provide advice to ensure that fisheries are safeguarded and that the Environment Agency's duty to fisheries is not prejudiced.

The fisheries interest in the Curry Moor and Hay Moor main drains is fairly limited and can be affected by low oxygen levels that have resulted in fish rescues being undertaken. The fish interest in the River Tone is more significant, with salmon and eels migrating up the tidal Tone as well as local freshwater fish and estuarine fish such as the grey mullet, bass and flounders. There is also a fish pass at New Bridge to aid the migratory fish during the summer months when New Bridge Sluice is penning.

Some of the watercourses in the catchment area are de-silted and weed-cut for flood risk management purposes. As these practices can disturb spawning fish, remove spawn or reduce cover for fry, the method and timing of weed cutting and de-silting must be carefully considered to avoid these impacts. In some watercourses, excessive build up of duckweed at penned structures can be a problem during the summer that can result in de-oxygenation. Removal of the duckweed is difficult, although the use of floating booms across the watercourse can help to prevent the duckweed from completely covering the water surface.

5. Nature conservation and archaeology

5.1. Nature conservation interests

The Plan area contains:

- a) An essential part of the largest area of lowland wet grassland remaining in England (the Somerset Levels and Moors), supporting an important assemblage of breeding waders and wetland birds, notably snipe, curlew, redshank, lapwing and yellow wagtail.
- b) Part of a large wetland of international importance for its overwintering and migratory populations of waterfowl, and in particular golden plover, teal, wigeon, shoveler and lapwing.
- c) Part of a large wetland of international importance for its outstanding assemblage of rare invertebrates, particularly water beetles.
- d) Part of a wetland of national importance for:
 - Ditch flora, including species which are nationally scarce, and relict fen species on ditch banks;
 - Ditch fauna, including species which are nationally rare or scarce;
 - Meadow fauna, including species which are nationally rare or scarce;
 - Breeding wetland birds, such as sedge and reed warblers, lapwing, snipe, ducks and rails / crakes.

The Plan area includes:

- a) Curry and Hay Moors SSSI (474 hectares / 1171 acres) notified in 1992;
- b) Part of the Somerset Levels and Moors Special Protection Area, designated under the European Community's Directive on the Conservation of Wild Birds in June 1997;
- c) Part of the Somerset Levels and Moors Ramsar Wetland of International Importance, designated under the terms of the Ramsar Convention in June 1997.

The locations of the nature conservation sites are shown on Map 5 and Natural England's advice to the Parrett IDB on the water management requirements for Curry and Hay Moors SSSI is summarised on Map 7.

Box 1: Favourable condition for wetland SSSIs in Somerset

An SSSI is considered to be in favourable condition when the special habitats and features of an SSSI are in a healthy state and are being conserved for the future by appropriate management. The Government's Public Service Agreement with DEFRA requires that 95% of all nationally important wildlife sites (SSSIs) are in a favourable (or unfavourable recovering) condition by the end of 2010.

Water management requirements for wetland SSSIs in Somerset

The following information summarises Natural England's advice to the Parrett IDB on the water management requirements needed for wetland SSSIs in Somerset to achieve favourable condition.

For ditch and grassland interests in winter:

- At least 30cm of water in the bottom of rhynes and ditches except in those around the margins of the SSSI where the ground levels are slightly higher.
- Summer water level at not more than 30cm below mean field level from 1 April to 30 November.

For wintering birds:

In early winter (from mid November):

- Gradual rising water levels to create extensive pools providing surface water covering 20 to 50% of the majority of fields with the lowest lying fields being close to 50%.

In mid winter (1 December to 28 February):

- Extensive areas of splashy conditions and shallow pools up to 25cm deep covering at least 50% of the majority of the fields;
- Deeper water roosts of at least 60ha, with water 25 to 75cm deep.

In late winter and early spring (to end of March):

- Gradual lowering of mid winter levels with some splashy conditions and shallow pools remaining through late February and into March in the lowest fields.

For breeding waders in spring (ideally blocks 50ha or more in size):

In early spring (1 March to 30 April):

- Extensive pools providing surface water covering up to 25% of the majority of fields with the lowest lying fields being close to 25%.
- On higher fields and species-rich fields, limited surface water covering less than 10% of the field.

In mid spring (May):

- Some pools in the lower lying fields covering up to 15% of surface area with soft ground and damp soils elsewhere;
- Low intensity grazing from mid-May in those fields not being laid up for hay.

In late spring (June):

- A few surface pools present in the lowest lying fields towards the end of this period and into July.

5.2. Biodiversity Action Plans

The floodplain grazing marshes found within the Curry Moor area are considered a habitat of primary importance in the UK Biodiversity Action Plan (BAP) 1996. Furthermore, the 76km of Main Rivers and Viewed Rhynes in the Plan area, and the associated network of ditches and ponds, are biodiversity rich habitats that support good populations of priority BAP species such as water voles and otters.

The IDBs in Somerset have recently completed a biodiversity audit of all BAP species and habitats in their drainage districts and used this information to prepare a Biodiversity Action Plan relevant to IDB activities and interests (April 2010). The introduction of an IDB BAP for Somerset is intended to assist the integration of biodiversity conservation and enhancement works into IDB planning and work programmes. The new IDB BAP will also allow the Somerset IDBs to demonstrate and record their important contributions to conserving biodiversity. The Somerset IDB BAP sets objectives and targets for the conservation and enhancement of wetland species and habitats, and provides a link to the national and local BAP targets. The IDB BAP will also be used to report progress on the implementation of all IDB WLMPs in Somerset.

5.3. Conservation management

The current practices adopted by the Parrett IDB and the Environment Agency for the maintenance of watercourses help to maintain the conservation and biodiversity interest of these wetland habitats in balance with the need for effective drainage and irrigation throughout the Plan area.

Financial support for the conservation management of land is available to farmers and landowners from Natural England who administers the Environmental Stewardship scheme on behalf of DEFRA. Such agri-environment schemes operate on the principle that the landowner, or farmer, voluntarily enters into an agreement where payment is made in return for following land management practices that benefit the environment. Farmers can join Entry Level Stewardship (ELS), where a basic payment is made for 5 years for basic environmental management, or Higher Level Stewardship (HLS), which is more targeted and provides higher payments for more demanding conservation management over 10 year agreements. Many farmers in the area have still to complete their agreements under the previous Somerset Levels and Moors Environmentally Sensitive Area (ESA) Scheme.

5.4. Archaeology

The wetlands of the Somerset Levels and Moors contain a wealth of archaeological information often hidden under layers of peat and clay that have built up over many millennia. This has had three significant effects:

- a) Organic remains such as wood and leather are preserved because the waterlogging excluded oxygen and prevented the normal types of decay which destroy these materials on normal archaeological sites;
- b) The waterlogged conditions also preserve pollen grains, plant material, insects, snails and even macroscopic plant and animal remains. These constitute a unique record of the past natural and man-made environment stretching back over the last 6,000 years. They can also provide information concerning human activity on the neighbouring dry land, and past changes in climate and sea levels;
- c) The normal methods of archaeological detection do not work well in wetland areas where sites can be deeply buried. The number of known archaeological sites is therefore only a small fraction of the existing total. It is extremely likely that all the river valley wetlands in Somerset contain a wealth of important archaeological sites. In

addition there are several types of sites such as fisheries, medieval flood defences and small river ports of which we know very little, but may exist in considerable numbers.

The organic archaeological remains from the Somerset Levels and Moors depend for their continued survival on an anaerobic waterlogged burial environment. If the surrounding peat or clay dries out the organic material will shrink considerably and crack apart. The presence of oxygen will also allow bacterial and fungal decay to resume and eventually completely destroy the artefacts.

The peat itself, and the precious information contained within it, is also adversely affected by desiccation. Where field water tables are below ground level for long periods of time, the shrinkage and chemical breakdown of peat soils can be significant and can destroy all the archaeological information contained within them. In this regard the summer is the crucial period, as that is when in-field water tables are generally at their lowest and therefore peat wastage highest.

All the known archaeology in the area is contained in the County Sites and Monuments Record which is kept in map form and on computer at County Hall, Taunton. This represents information collected from aerial photographs, excavations, chance finds, observations of drainage ditches and other sources. However in the Somerset Levels and Moors the deep deposits of clay and peat that have built up over thousands of years mean that much of the local archaeology in the area remains hidden from the normal forms of archaeological detection. Therefore the known archaeology recorded on the Sites and Monuments Record represents only a fraction of the total archaeological resource that lies below the surface.

A water management system beneficial to the preservation of wetland archaeological is a key objective of the WLMP. The locations of the archaeological sites in the Plan area are shown on Map 6.

6. Constraints and impacts on adjacent ground

6.1. Works adjacent to Main River

Any work proposed in, over, under or adjacent to Main River requires Flood Defence Consent (FDC) from the Environment Agency. Land Drainage Byelaws require third parties to apply for consent for any alterations or new works within an eight metre strip on either side of the Main Rivers. Where consent is applied for on land which forms part of an SSSI or other designated sites, the applicant is obliged to consult Natural England. Where works may affect a European designated site, the Environment Agency will undertake a test of likely significance and seek Natural England's approval before a consent can be issued. These conditions will also apply to proposals that lie outside the boundary of designated sites but which may impact on the site.

6.2. Works adjacent to Viewed Rhynes

Under the Land Drainage Act 1991, the Parrett IDB has administrative responsibility for all the Viewed Rhynes and ordinary watercourses within the Plan area for the purposes of consenting activities as set out in the IDBs Byelaws. The Parrett IDB exercises this administrative control using a series of policy documents adopted by the IDB for this purpose.

The Parrett IDB Byelaws require third parties to apply for consent for any alterations or new works within a nine metre strip on either side of a Viewed Rhyne. Where consent is applied for on land within a SSSI, the IDB consults Natural England before arriving at its decision. The form of consent given by the IDB states that such consent does not override the necessity of obtaining other statutory consents (including that of Natural England).

6.3. Private ownership of land and property rights

Most of the land within the Plan area is under private ownership and is occupied either by the owner or by tenants, licensees, graziers etc. For the WLMP to be sustainable and succeed, any works or proposals to vary water levels must respect all legal obligations and responsibilities including property rights. As mentioned in 4.1, the predominant land use across the Plan area is agriculture, and changes in water levels can potentially have a significant impact on agricultural activities carried out by owners and/or occupiers. Changing of water levels to achieve conservation objectives (e.g. within SSSI areas) will be achieved most sustainably through negotiation of individual agri-environment agreements under the HLS scheme, whereby farmers receive an appropriate payment in return for their management which delivers the public benefit (in terms of favourable SSSI condition).

7. Current water management practices

7.1. Current water level management regime

In general, water levels are maintained at a relatively high level during the summer months to provide wet fences and, to a certain extent, to keep water tables high to promote the growth of grass and other crops. During the winter periods, water levels are lower in order to accommodate increased rainfall and runoff, and to reduce the risk or severity of flooding.

Seasonal changes in water levels are normally implemented on the 1 April for summer levels and 1 December for winter levels. In practice however, the seasonal water levels are usually phased in two weeks either side of these 'normal operating dates'. This system has come about through custom and practice and generally works well. From time to time, depending on the prevailing weather conditions, requests may be received by the Parrett IDB to advance or delay these seasonal operations. Under these circumstances, the IDB will consult Natural England before advancing or delaying the normal operating dates by more than two weeks.

Contingency measures for drought

During a drought situation the Environment Agency will encourage the public and industry to practice water efficiency and to conserve water, whilst all abstraction licence holders will be encouraged to minimise water abstraction. There will also be close liaison between the Environment Agency and the Parrett IDB to conserve water and to ensure a fair distribution of what water is available.

If there is an exceptional shortage of rain, or a serious deficiency in water flow that threatens flora or fauna, drought permits or orders may be issued. Drought permits are issued by the Environment Agency to enable water companies to take water from new sources or to alter restrictions on existing abstractions. Drought orders, issued by the Secretary of State, go further and restrict the non-essential use of water.

7.1.1. Current target water levels

The current target water levels for key control structures within the Plan area are set out in Table 8 and any proposed changes in target waters levels are detailed in Table 11. The Parrett IDB will consult Natural England and the Environment Agency if they are considering changing the water levels at a structure so that it falls outside the range given in the Plan. Target water levels have been adjusted for gauge board errors and relate to metres above Ordnance Datum Newlyn (ODN).

Table 8: Current target water levels for Curry Moor

Water level control structures	Grid ref.	Operated by	Summer water levels (m ODN)	Winter water levels (m ODN)	Flood conditions
Curry Moor Pumping Station	ST 3447 2882	EA	4.42	3.80	Pumping when conditions allow
New Bridge Sluice	ST 3163 2691	EA	6.12	Open	Open
Fox's Mead Clyse No 1	ST 3366 2791	EA	4.80	Open	Open
Fox's Mead Clyse No 2	ST 3366 2791	EA	Closed	Closed	Open
C1 Currymoor Drove [1]	ST 3033 2641	EA	5.97	5.67	-
C2 Currymoor [1]	ST 3074 2686	EA	5.55	5.25	-
C3 Currymoor Drove [1]	ST 3142 2712	EA	5.20	4.90	-
C4 Currymoor Drove [1]	ST 3159 2713	EA	5.20	4.90	-
C5 Stoke Drove	ST 3251 2759	EA	4.74	4.34	-
H1 Haymoor	ST 3089 2631	EA	5.96	5.66	-
H2 Haymoor	ST 3155 2644	EA	5.26	4.96	-
H3 Moredon Drove	ST 3247 2686	EA	5.20	4.90	-
Cames Mead Sluice (Tanners Bar Sluice)	ST 3325 2723	EA	Closed	Open	-
Weir B CM002 [1]	ST 2997 2595	IDB	6.75	6.45	-
Weir J CM003 [1]	ST 3004 2652	IDB	5.95	5.65	-
Weir C CM004 [1]	ST 3038 2648	IDB	5.95	5.65	-
Weir F CM005 [1]	ST 3084 2698	IDB	5.45	5.15	-
Weir G CM007 [1]	ST 3168 2719	IDB	5.10	4.80	-
Sluice K CM008	ST 3180 2727	IDB	Closed	Open	-
Weir E CM009	ST 3148 2746	IDB	5.35	5.05	-
Weir L CM0010	ST 3209 2749	IDB	3.90	3.60	-
Weir M CM011	ST 3320 2705	IDB			
Weir I CM012	ST 3229 2797	IDB			
Bay H CM013	ST 3244 2791	IDB			
Hook Bridge Spillway	ST 3352 2754	EA	Overtops when levels in the Tone exceed 7.39m		
Athelney Spillway	ST 3427 2925	EA	Overtops when levels on Curry Moor exceed 7.10m		
Lyng Railway Cutting	ST 3312 2879	EA	Overtops when levels on Curry Moor exceed 7.10m		
Baltmoor Wall	ST 3377 2908	EA	Overtops when levels on Curry Moor exceed 8.10m		
North Moor Pumping Station	ST 3315 3301	EA	3.30	3.07	Pumping when conditions allow
Salt Moor Pumping Station	ST 3531 3087	EA	3.65	3.45	Pumping when conditions allow
Stan Moor Pumping Station	ST 3614 2984	EA	4.20	3.65	Pumping when conditions allow

- Notes:**
- **Summer season:** Aim to achieve summer pen levels by 1st April.
 - **Winter season:** Aim to achieve winter pen levels by 1st December.
 - **[1]:** Level adjusted for gauge board error.
 - **ODN:** Ordnance Datum Newlyn.

7.1.2. Raised Water Level Areas

There is one privately operated Raised Water Level Area (RWLA) in the Plan area at Athelney Farm, where high water levels are maintained in winter (5.00m) to provide suitable wetland conditions for wildfowl and waders including a safe roost (see Box 2 for target conditions). The Athelney Farm RWLA is 14ha (34.5 acres) and was constructed in 2003. The location of this area is shown on Map 4.

7.2. Current flood management regime

The Environment Agency has permissive powers to carry out works to reduce flood risk on Main Rivers. The primary flood defences within this Plan area are raised earth embankments located on either side of the River Tone, with a few small sections of harder engineering (e.g. steel piles and masonry walls) where space is at a premium. These defences are inspected regularly to ensure they provide the flood risk management benefit that they were designed for. The Environment Agency also undertakes routine maintenance i.e. weed cutting, flailing, and occasional tree pruning and removal. Emergency repair and maintenance works are carried out when necessary. Environment Agency staff are deployed to monitor high tides on the tidal section of the Tone up to Newbridge Sluice.

The Environment Agency regularly inspects and operates the main inlet structures into the Plan area. These are closed when water levels in the River Tone rise in order to minimise risk of flooding from the river. During flooding conditions in the moor, the Pumping Station is operated by the Environment Agency to drain the moor until high river levels stop effective evacuation of water. At this point, the pumps are manually switched off, and operatives monitor the situation until they can resume pumping. Power to site can be isolated to prevent devices shorting out and risk to the network.

Curry Moor is a flood storage area which consists of many structures and was classified under the Reservoirs Act 1975. In accordance with the Reservoirs Act, the Curry Moor structures are inspected by an engineer annually.

7.2.1. Contingency measures for flooding

The Environment Agency carries out active monitoring of raised flood banks during high flows, and ensure that outfall structures are kept clear of debris to allow evacuation of flood water as safe working conditions allow. The Environment Agency will also carry out emergency works as required to protect people and property.

The Environment Agency and the Parrett IDB are investigating the potential benefits of pre-emptive lowering of water levels at key control structures in anticipation of extreme weather conditions. It has been suggested that early action at certain control structures may reduce the severity of damage caused by overland flooding at critical times of the year, especially in summer. This work is at an early stage and will need to consider the impacts on the SSSI and the concern that it may be difficult to restore summer pen levels if forecast rainfall does not occur.

The Parrett IDB will ensure that all weed-screens on Viewed Rhynes are cleared on an 'as required basis' and that watercourses are running freely to assist the evacuation of flood water.

Box 3: Curry Moor and the Reservoirs Act 1975

Reservoir Dams are an important part of flood risk management. They provide the ability to slow flood flows down and discharge river water at a controlled rate. They are usually constructed upstream of urban area and provide flood protection to properties downstream. The reservoir structures in Wessex vary from ancient medieval embankments to dams that have been constructed within the last 30 years.

Curry Moor Flood Storage Area is situated approximately 9km west of Langport, adjacent to the River Tone. It has evolved over many centuries and was strengthened in 2001. It consists of many structures as listed below:

- a) Baltmoor Wall (Category B) -
 - i. Saxonburgh Gardens - Stone retaining wall.
 - ii. Baltmoor Wall - Concrete faced wall with highway on top.
 - iii. Moorside Ramp - Concrete ramp into property driveway with water trap.
 - iv. Earth filled bank with stone walling to northern face.
- b) Hill Section (Category C) - natural high level ground.
- c) Athelney Farm Section (Category C) - Earth embankment with masonry wall behind running along the length of the access track into the farm. Includes concrete slab entrance into field at northern end.
- d) Banklands and Banklands Bungalow (Category C) - The defence through Banklands and Banklands Bungalow comprises an upstream masonry/stone wall, a stone and concrete crest and a downstream grassed slope.
- e) Stan Moor Cut Off Embankment (Category A) - Earth filled embankment adjacent to Curload Farm
- f) Stanmoor Feed - Taken off at Hook Bridge Siphon on the Haymoor side, is a concrete culvert with a control penstock feeding water into Stanmoor.
- g) Haymoor Siphon - Armco culvert inverted siphon under River Tone with headwalls on Haymoor side.
- h) Athelney Spillway.
- i) Lyng Cutting Spillway.
- j) Baltmoor Wall Inlet - Penstock and culvert through Baltmoor wall to feed North Moor and Salt Moor.

An assessment of each structure of the reservoir has categorised the assets as A, B or C in accordance with the ICE 'Flood and Reservoir Safety An Engineering Guide, 3rd Editions, 1996' under the Reservoirs Act 1975. Breach of Category A structures could endanger lives within a community. Breach of Category B structures could endanger lives not within a community, or could result in extensive damage. Breach of Category C structures would cause a negligible risk of loss of life and cause limited damage.

The reservoir accepts flood water from the spillway at Hook Bridge which is overtopped when the River Tone is in flood. Athelney Spillway to Northmoor runs at 7.20m OND. Evacuation of flood water from the reservoir is described in other sections.

The Environment Agency is the Undertaker for the dam structures under the Reservoirs Act 1975.

Box 4: Flood Zones

The Flood Map shows areas across England and Wales that could be affected by flooding from rivers and/or the sea. It has been produced by the Environment Agency to raise awareness among the public, local authorities and other organisations of the likelihood of flooding and to encourage people living and working in areas prone to flooding to find out more and take appropriate action. The Flood Zones in the Plan area are shown in Map 8.

Flood Zones are also known as floodplains which could be affected by flooding from rivers and the sea. There are three zones which are defined in the Government's planning policy for England. They ignore the presence of existing flood defences as these can be overtopped and even fail in an extreme event.

Zone 1 - is shaded white and shows areas with the lowest probability of flooding from rivers or the sea and where the chance of flooding in any one year is less than 0.1% (i.e. less than a 1 in 1000 chance).

Zone 2 - is shaded turquoise and shows areas where the chance of flooding in any one year is between 0.1% and 1% for flooding from rivers (i.e. a 1 in 1000 to a 1 in 100 chance), or 0.5% for flooding from the sea (i.e. 1 in 200 chance). The outer edge of this zone is referred to as the 'Extreme Flood Outline' (EFO).

Zone 3 - is shaded blue and shows areas with the highest probability of flooding where the chance of flooding in any one year is greater than 1% for flooding from rivers (i.e. a 1 in 100 chance), or 0.5% flooding from the sea (i.e. a 1 in 200 chance).

It is important to understand that a 1 in 100 chance of flooding in any one year does not mean that level of flood will happen once every 100 years, nor does it mean that if the flood hasn't happened for the last 99 years, it will happen this year. In fact, a flood of this magnitude may occur more than once in a year.

7.3. Current watercourse maintenance regimes

7.3.1. Environment Agency maintenance practices

The Environment Agency assesses all maintenance works on the basis of flood risk to people and property, and whether the management system is rated as high, medium or low risk. As a result, annual maintenance is targeted towards high risk systems. The Environment Agency regularly reviews its annual and intermittent maintenance procedures, in accordance with national guidance and policy, to ensure that a high level of flexibility and efficiency of funding and staffing allocation are achieved.

The Environment Agency operates a flexible, annual weed cutting programme during the summer months. The Main Rivers are inspected prior to starting, and the programme can be changed to accommodate urgent cuts or abnormal weather and vegetation conditions. It is normal practice to provide good access for weed-cutting machinery, which consists of culverting side ditches and providing gates and side fencing so that travel across field boundaries is unrestricted. The Environment Agency does not typically use herbicides in the Plan area.

The River Tone lies within the Plan area and receives water from the Curry Moor Pumping Station. The left and right banks of the River Tone are flailed annually where no regular grazing takes place. This is done to control weed growth and reduce the risk of animal infestation which could destabilise the banks. The tidal sections of the River Parrett and River Tone carry heavy silt loads on each tide and the merits and cost effectiveness of de-silting these rivers has recently been investigated by the Environment Agency.

Trees, branches and bushes within the channel area may be trimmed, coppiced or pollarded to allow maximum flow, whilst retaining as much shade as possible to reduce weed growth. Tree removal will take place in exceptional circumstances where blockage of the channel has occurred, or is likely to occur. The Environment Agency expects riparian landowners to maintain trees and vegetation that could cause flood risk. Where necessary, the Environment Agency will serve notice on landowners to ensure that works are completed as requested. Where the Environment Agency owns land, it will carry out any required tree maintenance.

7.3.2. Parrett IDB maintenance practices

The Parrett IDB maintains all Viewed Rhynes in the Curry Moor area once a year in late summer. Viewed Rhynes are occasionally de-silted to prevent their condition from deteriorating and to sustain the required water depth and flow. Aquatic herbicides are not routinely used by the IDB, but may be used to control invasive plants. The use of aquatic herbicide in any watercourse requires consent from the Environment Agency and from Natural England when used within the SSSI.

The maintenance of watercourses adjoining Viewed Rhynes is the responsibility of the riparian occupiers. The Board has powers under its Byelaws to require occupiers to fulfil their obligations in this respect where they fail to do so.

Water control structures are inspected by the Parrett IDB on a regular basis and repaired as necessary. The Board does not accept any liability for the maintenance of bridges and culverts over Viewed Rhynes, however it is prepared to consider making an *ex gratia* contribution of a share of the cost of such maintenance, approximately in proportion to its usage by the IDB. The Parrett IDB does not accept any liability for the maintenance of droves, and only carries out such maintenance, or contributes to the cost of maintenance, where droves are essential to the Board for gaining access to a channel, or where damage has been caused by works carried out on behalf of the IDB.

8. Objectives for water level management in the future

The Water Level Management Plan is based on the following objectives which have been adopted by the signatories to the Plan. The signatories acknowledge that not all the objectives can be achieved on each and every occasion or location.

Objective 1 – Balance of interests

Firstly, ensure that all legal obligations and responsibilities are met and secondly, balance different interests by managing water in a way that reflects the local hydrology and topography of the area and which best serves the owners and farmers of the majority of the land within each sub-catchment.

Objective 2 – Agriculture

Maintain seasonal water levels that provide wet fences, stock watering and drainage appropriate for the principal land management and farming practices in each sub-catchment.

Objective 3 – Biodiversity

Maintain and enhance, when suitable opportunities arise, wet grassland, wetland and freshwater aquatic habitats and species throughout the Plan area, with particular attention being given to those protected by law or designated in some way.

Objective 4 – Favourable condition of SSSIs

Implement a programme of improvement works to ensure that the management of water that affects the SSSI in the Plan area helps to secure, or makes significant progress towards achieving, this SSSI being in favourable condition by December 2010.

Objective 5 – Organic soils and archaeology

Maintain a stable, year round water table that avoids desiccation and oxidation of the organic soils.

Objective 6 – Settlements and highways

Ensure the proposed changes in water management do not increase the flood risk to settlements, property, highways, utility infrastructure or rights of way.

Objective 8 – Watercourse maintenance operations

Maintain the watercourses in the Plan area on rotation and in a sympathetic manner, to maintain an adequate flow of water around the sub-catchments and to enhance the diversity of ditch habitats and their associated flora and fauna.

Objective 9 – Water quality

Sustain the ditch flora and fauna in the Plan area through the provision of an adequate supply of water of high quality (defined as having water in a ditch at a given season, of sufficient quality and volume to sustain the full diversity, abundance and distribution of all aquatic plants and animals recorded in the area).

Objective 10 – Flood management

Mitigate the impacts of flooding where these are damaging to the biodiversity and agricultural interests of the Plan area.

Objective 11 – Drought management

Mitigate the impacts of drought where these are damaging to the soils, biodiversity, archaeology and agricultural interests of the Plan area.

9. Proposed water management practices

9.1. Continuation of current good practice

Many of the current management practices carried out by the Parrett Drainage Board and by the Environment Agency are meeting the needs of both farming and conservation. These good practices will continue, as set out below.

Proposal 1: The current summer and winter penning levels at the key control structures, as set out in Table 9, will continue to be maintained by the Parrett IDB and the Environment Agency.

Reason: The current summer and winter water levels at many of the IDB and EA operated control structures are considered suitable for farming and nature conservation, and will continue to be maintained by the Parrett IDB and the Environment Agency (see Table 9 proposal 4).

Proposal 2: Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Parrett IDB.

Reason: The Parrett IDB will continue to maintain the existing Viewed Rhyne network, as shown on Map 2, and is of the opinion that its maintenance procedures help to achieve favourable condition and to further conservation and biodiversity in the Plan area. The Parrett IDB will complete its review of maintenance procedures and de-silt selected Viewed Rhynes (see Proposal 10).

9.2. Proposed changes to water control infrastructure

The Parrett IDB and Environment Agency have made major improvements to the water control infrastructure in the Curry Moor area in recent years (Table 9). No further changes to water control infrastructure are currently proposed for the Curry Moor area. However, The IDB and the Environment Agency will continue to monitor water levels to determine whether any additional improvements are required to meet the objectives for water management in the Plan area.

Table 9: Completed Environment Agency and Parrett IDB capital improvement works for Curry Moor

Action Ref.	Description of the capital works carried out to help achieve favourable conditions on Curry and Hay Moors SSSI	Works Completed
1.	Curry Moor Pumping Station (EA structure) – provision of permanent infrastructure allowing for the safe and efficient deployment of two portable pumps.	2009
2.	Newbridge Sluice on River Tone (EA structure) – partial refurbishment of existing structure.	2009
3.	Foxes Mead (EA structure) – replacement of undershot sluice door with variable split level door.	2005
4.	Penning bays C1, C2, C3, C4, C5, H1 H2 and H3 (EA structures) – replacement of drop-board sluices with new tilting weirs.	2005
5.	Penning bays CM002, CM003, CM004, CM005, CM007, CM009 and CM010 (IDB structures) – replacement of drop-board sluices with new tilting weirs.	2005

Proposal 3: Additional gauge boards and telemetry stations will be installed by the Parrett IDB and the Environment Agency in the Plan area.

Reason: The Parrett IDB and the Environment Agency proposes to install remote monitoring equipment and additional gauge boards on the Curry Moor Main Drain at Old Mead Drove and upstream of New Road on Curry Moor Drove Rhyne (Table 10). Alarm levels will be set for each station, which will report directly to the Drainage Board Office. The IDB has undertaken a level control survey of all gauge boards and benchmarks within the Plan area to establish their accuracy and determine whether any gauge boards need releveling or replacing.

The Environment Agency has installed new water level sensors at the Curry Moor Pumping Station to allow changes to be made in the water level regime at the station. The previous sensors did not provide a sufficient range to accommodate the proposed changes in winter water level at the pumping station.

Table 10: Proposed additional gauge boards and telemetry stations for Curry Moor

Location	Grid Ref	Notes	Operator
Curry Moor Pumping Station	ST 3446 2883	New Main Drain gauge board that is visible from outside the station	EA
Curry Moor Pumping Station	ST 3446 2883	New adjustable water level sensors for the station	EA
Curry Moor Main Drain - Old Mead Drove	ST 3353 2817	Remote water level monitoring and gauge board	EA / IDB
C3	ST 3142 2712	Remote water level monitoring	IDB

9.3. Proposed changes to target water levels

Proposal 4: The Parrett IDB and the Environment Agency will adopt the proposed changes in target water levels, as set out in Table 11, and trial these levels to ensure they meet the agreed objectives.

Reason: In 2005, the Parrett IDB and the Environment Agency replaced a series of stop-log structures with tilting weirs on Curry Moor and Hay Moor. These new structures have been operating over the past few years to provide improved water level control and to allow the conservation objectives to be achieved in parts of the Plan area affected by these structures. The IDB and the Environment Agency are monitoring water levels at the tilting weirs to ensure the objectives for water management continue to be met. The proposed changes in target winter water levels are set out in Table 11.

Natural England has advised that the lower sections of Curry Moor require an increase in winter water levels to provide a minimum depth of water in ditches for aquatic plants and invertebrates. Water levels in this section of the Plan area are controlled by the Curry Moor Main Drain and Pumping Station. The Parrett IDB and the Environment Agency therefore propose to maintain a water level of 4.20m at the Pumping Station to provide favourable ditch conditions in winter.

Natural England has also advised that water levels on the lower sections Curry Moor should be managed in winter to provide feeding areas and a safe roost site for wintering waterfowl and waders.

The following conditions would be required to provide a safe roost on Curry Moor:

- A water depth of 30 – 75cm above mean field level;
- Surface water maintained for at least 20 consecutive days in December, January or February;
- A continuous surface area of water about 35 – 50ha (i.e. not subdivided by ditch banks emerging above the surface of the water);
- Freedom from various forms of disturbance.

An assessment of water levels from 1999 to 2009 on Curry Moor showed that flooding occurred every year between 1 December and 1 March and that in six years out of ten this flooding lasted for longer than 20 consecutive days. Therefore, roosting and feeding conditions already occur on Curry Moor in most winters. A series of water level trials were undertaken in 2009 to 2011 to assess the practicalities of extending the duration of high water levels after small flood events to increase the value of Curry Moor as a safe roost.

The water level trials were used to identify the surface water conditions and accessibility to the centre of Curry Moor at different water levels:

- Water level between 4.50m and 4.70m: Areas of splash on the lowest fields. Access is unrestricted.
- Water level between 4.70m and 4.90m: Small areas of surface water subdivided by ditch banks and surrounded by extensive splash. Access is unrestricted.
- Water level between 4.90m and 5.20m: Several large continuous areas of surface water surrounded by extensive splash. Access is restricted.
- Water level above 5.20m: Extensive deep water conditions with splash conditions on higher fields to the west. Access is not possible.

The trials and consultation with farmers and willow growers clearly highlighted several practical difficulties in providing and maintaining a safe roost on Curry Moor. The main constraints that prevent Curry Moor from operating as a safe roost site are:

1. Achieving the water levels needed to provide a large enough area and depth of water that restricts access to the centre of the moor, and thereby limits disturbance of the roost, without affecting flood risk to New Road. The Environment Agency has advised that the maximum volume of water that can be held on Curry Moor without increasing the risk of flooding to New Road is 170,000m³. This volume is reached when water levels exceed 4.80m on the moor, whereas the droves remain accessible until water levels exceed 5.20m.
2. Achieving the necessary support amongst farmers and willow growers to allow flood levels to be maintained in winter for a roost in February. Some willow growers and farmers remain concerned about impacts on their businesses from restricted access for willow harvesting and the potential effects on grass growth and quality from maintaining flood levels in February.

Because of these practical constraints the Parrett IDB has agreed with Natural England and the Environment Agency that the Water Level Management Plan for Curry Moor should not include proposals for the management of Curry Moor as a safe roost in winter. However, the Plan does propose to maintain Curry Moor as a feeding area for the important populations of wintering waterfowl and waders, which roost elsewhere. The most favourable conditions for a feeding area occur as the flood level is falling from 4.90m down to 4.50m. Therefore, the final draw-down of a winter flood event should be made as gradually as possible.

The Environment Agency has installed a permanent facility for using portable pumps at the Curry Moor Pumping Station to allow Curry Moor to be maintained as a feeding area for wintering waterfowl and waders, without increasing the risk of flooding to New Road. The Environment Agency plans to use the portable pumps at Curry Moor Pumping Station in the following circumstances:

1. When New Road has flooded or is at immediate risk of flooding;
2. To minimise environmental and agricultural impacts caused by overland flooding in summer;
3. To restore flood storage capacity in advance of high flows in the River Tone;
4. To allow the retention of some surface water in December and January to maintain wintering waterfowl and wader habitat in drier winters;
5. If the main pumps fail or are undergoing maintenance.

Curry Moor Pumping Station capacity:

- 1 static *Archimedes screw* pump = 0.50 cubic metres per second
- 2 static diesel pumps = 2.50 cubic metres per second each
- 2 portable pumps = 0.875 cubic metres per second each

Total output of static and portable pumps = 7.25 cummecks

All pumping capacities are dependent on the intake conditions at the pumps and the water level in the River Tone.

Table 11: Proposed target water levels in Curry Moor

Water level control structures	Grid ref.	Operated by	Existing summer water levels (m ODN)	Existing winter water levels (m ODN)	Proposed summer water levels (m ODN)	Proposed winter water levels (m ODN)	Flood conditions	
Curry Moor Pumping Station	ST 3447 2882	EA	4.40	3.80	4.40	4.20 [2]	Pumping when conditions allow	
New Bridge Sluice	ST 3163 2691	EA	6.10	Open	6.10	Open	Open	
Fox's Mead Clyse No 1	ST 3366 2791	EA	4.80	Open	4.80	4.50 [2]	Open	
Fox's Mead Clyse No 2	ST 3366 2791	EA	Closed	Closed	Closed	Closed	Open	
C1 Currymoor Drove [1]	ST 3033 2641	EA	5.95	5.65	5.95	5.65 [2]	-	
C2 Currymoor [1]	ST 3074 2686	EA	5.55	5.25	5.55	5.25 [2]	-	
C3 Currymoor Drove [1]	ST 3142 2712	EA	5.20	4.90	5.20	4.90 [2]	-	
C4 Currymoor Drove [1]	ST 3159 2713	EA	5.20	4.90	5.20	4.90 [2]	-	
C5 Stoke Drove	ST 3251 2759	EA	4.75	4.35	4.75	4.35 [2]	-	
H1 Haymoor	ST 3089 2631	EA	5.95	5.65	5.95	5.65 [2]	-	
H2 Haymoor	ST 3155 2644	EA	5.25	4.95	5.25	4.95 [2]	-	
H3 Moredon Drove	ST 3247 2686	EA	5.20	4.90	5.20	4.90 [2]	-	
Comes Mead Sluice (Tanners Bar Sluice)	ST 3325 2723	EA	Closed	Open	Closed	Open	-	
Weir B CM002 [1]	ST 2997 2595	IDB	6.75	6.45	6.75	6.45 [2]	-	
Weir J CM003 [1]	ST 3004 2652	IDB	5.95	5.65	5.95	5.65 [2]	-	
Weir C CM004 [1]	ST 3038 2648	IDB	5.95	5.65	5.95	5.65 [2]	-	
Weir F CM005 [1]	ST 3084 2698	IDB	5.45	5.15	5.45	5.15 [2]	-	
Weir G CM007 [1]	ST 3168 2719	IDB	5.10	4.80	5.10	4.80 [2]	-	
Sluice K CM008	ST 3180 2727	IDB	Closed	Open	Closed	Open	-	
Weir E CM009	ST 3148 2746	IDB	5.35	5.05	5.35	5.05 [2]	-	
Weir L CM0010	ST 3209 2749	IDB	3.90	3.60	3.90	3.60 [2]	-	
Weir M CM011	ST 3320 2705	IDB						
Weir I CM012	ST 3229 2797	IDB						
Bay H CM013	ST 3244 2791	IDB						
Hook Bridge Spillway	ST 3352 2754	EA	Overtops when levels in the Tone exceed 7.39m					
Athelney Spillway	ST 3427 2925	EA	Overtops when levels on Curry Moor exceed 7.10m					
Lyng Railway Cutting	ST 3312 2879	EA	Overtops when levels on Curry Moor exceed 7.10m					
Baltmoor Wall	ST 3377 2908	EA	Overtops when levels on Curry Moor exceed 8.10m					
North Moor Pumping Station	ST 3315 3301	EA	3.30	3.10	3.30	3.10	Pumping when conditions allow	
Salt Moor Pumping Station	ST 3531 3087	EA	3.65	3.45	3.65	3.45	Pumping when conditions allow	
Stan Moor Pumping Station	ST 3614 2984	EA	4.20	3.65	4.20	3.65	Pumping when conditions allow	

- Notes:**
- **Summer season:** Aim to achieve summer pen levels by 1st April.
 - **Winter season:** Aim to achieve winter pen levels by 1st December.
 - **[1]:** Level adjusted for gauge board error.
 - **[2]:** Level subject to trial.
 - **ODN:** Ordnance Datum Newlyn.

Proposal 5: The Parrett IDB will support the management of Raised Water Level Areas in the Plan area as set out in Table 13.

Reason: Within the framework provided by the operation of the arterial watercourses and control structures, the Parrett IDB will support the management of RWLAs in the Plan area, where they do not adversely affect the management of neighbouring land. Where conflict does occur, the IDB will work with landowners to achieve the best water management solution.

The Parrett IDB acknowledges that there may be the potential to increase the area managed with raised water levels in winter and / or the spring within the Plan area. The Parrett IDB would support Natural England in their work to secure the appropriate agri-environment agreements to increase the area managed for breeding waders during the five years of this WLMP. The improvements to the water management infrastructure in this Plan would support, and not prejudice, the realisation of these opportunities in future years.

The areas with seasonally higher water levels are set out in Table 12 and their locations are shown on Map 4.

Table 12: Areas with seasonally higher water levels in Curry Moor

Raised water area	Name of operator	Area in hectares	Area in acres
Athelney Farm	Mr T Morgan	14	34.5

9.4. Proposed changes to operational procedures and responsibilities

Proposal 6: The Parrett IDB and the Environment Agency will adopt a flexible operating regime that allows water levels and seasonal penning dates to vary in response to weather conditions.

Reason: The Parrett IDB considers flexibility to be a critical element in the management of water across the Somerset Levels and Moors. The timing of operations (e.g. setting pen levels, watercourse maintenance) and the water levels need to be responsive to prevailing weather conditions. The date of operations and the water levels set out in this Plan are the product of many years experience and are most likely to be accurate for a ‘normal season’.

The Parrett IDB and the Environment Agency propose to adopt the principle that:

- The timing of the normal seasonal changes in pen level can vary by up to two weeks from the date specified in the Plan;
- The normal water level can range up to 50mm above the level specified in the Plan during dry conditions;
- The normal water level can range up to 100mm below the level specified in the Plan during wet conditions.

The Environment Agency and the Parrett IDB have agreed to meet three weeks before the normal seasonal changeover date to confirm summer / winter penning dates based on catchment conditions. If the season or local conditions require the Parrett IDB or the Environment Agency to operate outside these ‘normal’ parameters then consultation with Natural England will take place.

Proposal 7: The Parrett IDB, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and ensure water level management meets the agreed objectives.

Reason: Changes in water levels and operational practices will be monitored by the relevant authorities and assessed to determine their effects on conservation, agriculture and flood risk management. The Parrett IDB will report on the outcomes of this monitoring, at least once a year, for three years following the implementation of the Plan.

Several organisations are involved in monitoring environmental information that is relevant to the WLMP, as set out in Table 13.

Table 13: Monitoring arrangements for Curry Moor

Lead body	Topic of monitoring
Parrett IDB	<ul style="list-style-type: none"> • Target water levels at key IDB control structures; • Maintenance of Viewed Rhynes; • Monitoring channel profiles and conveyance in Viewed Rhynes; • Maintenance of minor watercourses, farmers ditches etc; • Water quality.
Environment Agency	<ul style="list-style-type: none"> • Target water levels at key Agency control structures; • Maintenance of Main Rivers; • Monitoring channel profiles and conveyance in Main Rivers; • Catchment rainfall and weather events; • Water quality.
Natural England	<ul style="list-style-type: none"> • Plant, bird, invertebrate and mammal communities; • Land management; • Surface water and soil wetness conditions. • Water quality.

It is anticipated that an ongoing monitoring programme of long-term changes in the plant, bird, invertebrate and mammal communities of the Curry Moor area will be undertaken by Natural England and others. The data collected will be used in combination with Environment Agency and Parrett IDB environmental data, and local knowledge, to inform and refine decisions regarding suitable water levels in the future.

Proposal 8: The Parrett IDB and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.

Reason: There are merits to having one Operating Authority manage a greater proportion of the smaller structures that control water levels within a defined system. The Environment Agency and the Parrett IDB are negotiating the handover of maintenance and operational responsibility for some of the control structures currently maintained and operated by the Environment Agency.

DEFRA and Government priorities, with regards to flood risk management, have been evolving over the past few years. This has resulted in the Environment Agency having to review its priorities and activities. The Environment Agency currently maintains and operates many structures that provide essential land drainage and nature conservation benefits. It also manages and maintains Main Rivers that serve no critical flood defence benefit. In the future the Environment Agency may no longer be able to justify maintaining or operating these structures and watercourses. The Environment Agency is currently considering transferring responsibilities

for some water control structures to competent third parties and potentially de-maining some watercourses in the future.

One possible option is for the Parrett IDB to take over the ownership and management of these watercourses and structures, to continue a system of professional management and to provide continuity for the benefit of land owners and wildlife. The structures identified for this proposal are listed in Table 14.

Table 14: Proposed changes in ownership and responsibility of water control structures

Structure	Current operator	Proposed operator
Foxes Mead Sluice 1 - Haymoor Main Drain	EA	IDB
Foxes Mead Sluice 2 - Haymoor Main Drain	EA	IDB
Weir C1 - Currymoor Main Drain	EA	IDB
Weir C2 - Currymoor Main Drain	EA	IDB
Weir C3 - Currymoor Main Drain	EA	IDB
Weir C4 - Currymoor Main Drain	EA	IDB
Weir C5 - Currymoor Main Drain	EA	IDB
Weir H1 - Haymoor Main Drain	EA	IDB
Weir H2 - Haymoor Main Drain	EA	IDB
Weir H3 - Haymoor Main Drain	EA	IDB
Cames Mead Sluice - Haymoor Main Drain	EA	IDB

9.5. Proposed changes to maintenance practices

Proposal 9: The Parrett IDB will complete a review of IDB watercourse maintenance procedures in the Plan area.

Reason: In consultation with ratepayers and Natural England, the Parrett IDB will complete a review of the Board's procedures for maintaining Viewed Rhynes within the Plan area. The Parrett IDB will also establish a de-silting programme for Viewed Rhynes, to improve water circulation and to restore and enhance ditch habitats in areas affected by silt accumulation. High silt levels and shallow water depths can reduce water flow, increase water temperature in summer and adversely affect ditch habitat quality and availability. The IDB will inform Natural England of any changes to maintenance procedures that may affect the SSSI.

Proposal 10: The Environment Agency will complete its review of the maintenance of Main Rivers within and adjacent to the Plan area.

Reasons: The Environment Agency, in consultation with the Drainage Boards, is currently reviewing the maintenance of Main Rivers within and adjacent to the Plan area in the response to changing priorities. This relates specifically to a national risk based approach where the highest standards of maintenance are directed to where they are most needed to protect people and property.

The Environment Agency is currently investigating the effectiveness of silt removal from a number of Main Rivers and Drains in the Parrett IDB District including, the Rivers Parrett and

Tone, North Moor Main Drain and West Sedgemoor Main Drain. The Environment Agency will use the findings of these investigations to help determine the need for a programme of de-silting.

10. Unresolved matters

10.1. Climate change impacts

The potential effects of climate change and sea level rise on the Plan area are unclear at present. Studies by the Environment Agency, and others, should inform the Parrett IDB on these matters and the water management mitigation, or adaptation, required to accommodate these impacts.

The Government has recently introduced the Carbon Reduction Commitment, which the Environment Agency and other public sector organisations must comply with. The Environment Agency has set itself a target of 33% carbon reduction by 2015. Therefore, water level management needs to be carried out with the minimum of CO₂ output. The Parrett IDB will work with the Environment Agency to identify opportunities, such as maximising gravity discharge, and investigate the potential impacts of such measures on flood risk management and the environment.

10.2. Winter waterfowl safe roost

If the current issues and constraints were to be overcome in future, it would still be desirable to try to establish a safe roost for the benefit of the Special Protection Area. Wintering waterfowl and waders need safe roosts in addition to feeding areas. The moor acts as a large feeding area under the new arrangements, but there are few safe roosts available. Athelney farm RWLA is very small (14 ha) and the SSSI would be greatly enhanced by a safe roost of 50+ hectares.

11. Amendments agreed during the period of the Plan

Amendments to this Plan which are agreed by Drainage Board, the Environment Agency and Natural England are set out in Table 15.

Table 15: Amendments agreed during the period of the Plan

No.	Date	Amendment	Agreed

12. Review arrangements

The Parrett IDB proposes to review this WLMP in 2015, five years after it has been adopted. If any alterations to operating procedures or maintenance are required before 2015, these will be discussed by the IDB, the Environment Agency and Natural England and can be agreed as interim measures pending the full review.

13. Timetable of actions: Curry Moor WLMP

Proposed continuation of current good practice		
1:	The current summer and winter penning levels at the key control structures, as set out in Table 9, will continue to be maintained by the Parrett IDB and the Environment Agency.	Ongoing
2:	Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Parrett IDB.	Ongoing
Proposed changes to water control infrastructure		
3:	Additional gauge boards and telemetry stations will be installed by the Parrett IDB and the Environment Agency in the Plan area.	Complete by end 2011
Proposed changes to target water levels		
4:	The Parrett IDB and the Environment Agency will adopt the proposed changes in target water levels, as set out in Table 11, and trial these levels to ensure they meet the agreed objectives.	Winter 2010 onwards
5:	The Parrett IDB will support the management of Raised Water Level Areas in the Plan area as set out in Table 12.	Ongoing
Proposed changes to operational procedures and responsibilities		
6:	The Parrett IDB and the Environment Agency will adopt a flexible operating regime that allows water levels and seasonal penning dates to vary in response to weather conditions.	Immediate
7:	The Parrett IDB, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and ensure water level management meets the agreed objectives.	Complete by end 2012
8:	The Parrett IDB and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.	Ongoing
Proposed changes to maintenance practices		
9:	The Parrett IDB will complete a review of IDB watercourse maintenance procedures in the Plan area.	Complete by end 2011
10:	The Environment Agency will complete its review of the maintenance of Main Rivers within and adjacent to the Plan area.	Complete by end 2011